

Species richness and genetic diversity do not go hand in hand in alpine plants

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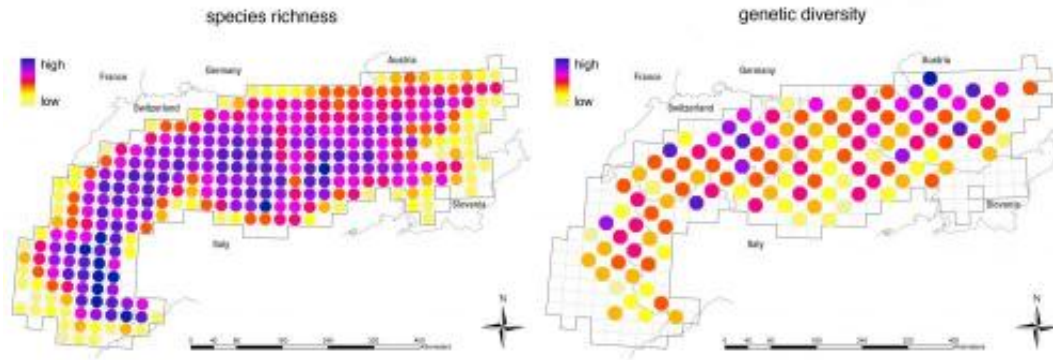


Creeping Avens (*Geum reptans*) thrives in acidic soils. It is one of the 27 types of alpine plants that were studied to investigate genetic diversity in the Alpine region. Credit: Felix Gugerli

An international team of researchers led by the University of Grenoble and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) has demonstrated for the first time that a high level of species diversity in alpine plants does not necessarily go hand in hand with a high level of genetic diversity. This finding suggests that new future strategies are needed to protect biodiversity in the Alpine region. The results of the study were published online in *Ecology Letters*.

Biodiversity can be described at three levels: ecosystem diversity, species diversity and [genetic diversity](#). Previous theory assumed that the three levels are congruent, amongst other reasons because they are subjected to the same processes. According to this claim, regions with a high level of ecosystem diversity should also be rich in species and those species should display a high level of genetic diversity. Genetic diversity is just as important as species diversity because it determines a species' adaptability to a changing environment. If [climate change](#) alters the prevailing [environmental conditions](#) in the Alps, the adaptability of alpine plants will be key to the long-term preservation of species diversity.

An international team of researchers led by the University of Grenoble and the Swiss Federal Institute for Forest, Snow and [Landscape Research](#) (WSL) has now discovered that a high level of species diversity does not necessarily go hand in hand with a high level of genetic diversity. The researchers studied the distribution pattern of 893 alpine plants throughout the Alps. After taking the genetic fingerprints of 27 of these species, they found that species-rich areas are distinct from areas harbouring high genetic diversity. Moreover, the researchers succeeded in pinpointing the reasons for this: in alpine plants, [species diversity](#) is influenced by local environmental conditions, whereas genetic diversity is determined by processes that led to the recolonisation of ice-free areas after the last Ice Age. Furthermore, a parallel study conducted in the Carpathian mountains shows that this finding for the Alps was no 'one-off' result.



Comparison of species richness and genetic diversity in alpine plants in the Alps.

These findings are highly relevant for the conservation of biodiversity in the Alps. Today's designated conservation areas are locations where rare species occur and where ecosystem diversity and thus the number of species are particularly high. However, this does not guarantee sufficient long-term protection for alpine plants because their genetic diversity is only insufficiently secured by current conservation areas. In future, then, existing conservation areas should be complemented by adding areas characterised by a high level of genetic diversity. In addition, new and existing conservation areas should be more efficiently interlinked, as this would guarantee the exchange of individual plants and their genes between different populations of [alpine plants](#) and thus also maintain genetic diversity in the long term.

More information: Taberlet P, Zimmermann NE, English T, Tribsch A, Holderegger R, Alvarez N, Niklfeld H, Coldea G, Mirek Z, Moilanen A, Ahlmer W, Ajmone-Marsan P, Bona E, Bovio M, Choler P, Cieślak E, Colli L, Cristea V, Dalmas J-P, Frajman B, Garraud L, Gaudeul M, Gielly L, Gutermann W, Jogan N, Kagalo AA, Korbecka G, Küpfer P, Lequette B, Letz DR, Manel S, Mansion G, Marhold K, Martini F, Negrini R, Niño F, Paun O, Pellecchia M, Perico G, Piękoś-Mirkowa H, Prosser F, Puşcaş M, Ronikier M, Scheuerer M, Schneeweiss GM,

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